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Dynamic Interactions of Nigerian Stock Market and Macroeconomic Variables

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Abstract
This study investigated the Dynamic Interactions of Nigerian Stock Market and Macroeconomic Variables with annual data collected from the Central Bank of Nigeria, Nigerian Stock Exchange Fact Books and National Bureau of Statistics from 1985 to 2018. It was found that economic growth proxied by Growth Domestic product and Interest rate have positive and significant relationship with all share index within the period of study, while inflation exerts negative influence on All Share Index. It was also found that exchange rate has insignificant impact on All Share Index within the scope of the study. Consequently, the researchers are of the opinion among others that government and her regulatory bodies devise adequate measure to curtail inflation in Nigeria.
Keywords: Nigeria Stock Market, All Share Index, Macroeconomic Variables, ARDL.
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1. Introduction

The capital market is a market for variety of long term debt and equity securities issued by companies from private and public sector, other bodies corporate and government. It deals with the raising of capital by issuers through issue of various types of securities and in the subsequent trading thereof between investors. The trading of securities happens through an institutional mechanism known as stock exchange where securities are publicly bought and sold. Not only that stock market is the foundation and engine that propels economic growth and development of a nation, it is inextricably interwoven in the fabrics of nation' economic life. The absence of the stock market will frustrate the savings of the society, which are the sinews of economic progress and productive efficiency. Stressing the importance of the stock market, Forson and Janrattanagul (2014) advocated that stock markets facilitate economic growth by enhancing liquidity and providing funds for industrialization and economic development. They also act as interesting investment centers and avails long-term capital to the listed firms by pooling funds from different investors and allow them to expand in business by offering investors alternative investment avenues to put their surplus funds. Stock Exchange market plays a crucial role in economy of the country, which transfers investment fund from stock investors to stock borrowers which is necessary for healthy economy. A stock exchange market is simply a market where securities (stocks, bonds etc.) are traded (Ilahi, Ali, and Jamil, 2015). Adeboye (2012) added that the stock market plays a major role in financial intermediation in both developed and developing countries by channeling idle funds from the surplus to deficit units of the economy. Capital market instruments include bonds, shares, long term development stocks of government (Onoh, 2002; Ezirim, 2005).

The performance of an economy can be measured by real GDP growth rate, rate of inflation, exchange rate, fiscal position, debt position and many other variables, which can also serve as the major determinants of economic growth. Since the stock market reflects the economic fundamentals, stock market prices should be employed as a leading indicator of future economic activity (Pal & Mittal, 2011). Again, performance of the stock market is influence by exogenous variables often perceived as Macroeconomic variables. These macroeconomic variables guide investors consider when they value stocks. Interest rates, exchange rate, inflation, Gross Domestic Product (GDP) and money supply are the prominent among the macro- economic variables in Nigeria (Graham & Harvey, 2001; Kim, 2003; Rapach, Wohar and Rangvid,2005; Yau & Nieh, 2006; Abraham, 2016; Adrangi, Chatrath and Sanvicente, 2011; Arodoye, 2013; Udi and Ohwofasa, 2018). In support, Solnik (1987) established the effect of a number of variables (interest rate, inflation, exchange rate) on stock prices. To validate the expectation, Solnik (1987) established the effect of a number of variables (interest rate, inflation, exchange rate) on stock prices with monthly data of nine most developed nations (U.S, Japan, Germany, U.K, France, Canada, Netherlands, Switzerland, and Belgium) and found a positive impact on between macroeconomic variables and stock market.

The researchers having read numerous theoretical and empirical literatures on the relationship between stock market index and macroeconomic variables were challenged to make their stand on the subject matter. Notwithstanding the fact that plethora studies have been made both in developed, emerging, developing and underdeveloped nation, the researchers are still bothered about the divergent opinions. Hence, are moved to unravel the dynamic interactions of macroeconomic variables and stock market in Nigeria.

The remaining sections of this study are structured as follows; section two takes care of review of theoretical and empirical literature; section three handles the materials and methods of analysis adopted; section four analyses the data, results and interpretation while section five addresses conclusion and recommendation. The last section 'six takes care of suggestions for further studies and limitation of the study.

2. Review of Related Literature

The relevance of stock market has been recognized by some developing countries as they improve the quality and efficiency of domestic financial system. This has inspired researchers to investigate the variables affecting stock markets (Aliyu, 2009; Pramod-Kumar & Puja, 2012; Bhunia, 2012; Osamwonyi & Evbayiro-Osagie, 2012). Stock traded therein is one of the volatile and sensitive of all the financial assets. As such it should be handled with care. Any aggressive change in price of stock is capable of generating adverse effect on the economy. Stock price movements are by their nature essentially random, and prices adjust rapidly in response to economic news, such as news regarding domestic and international shocks. Daily gains and losses by stock market investors demonstrate the extent to which individual stock returns fluctuate in response to a variety of unanticipated event (Forson and Janrattanagul, 2014). Forson and Janrattanagul (2014) stock prices are determined by supply and demand. A high demand for a particular stock will drive the stock price up. Conversely, a loss of confidence in a particular stock will cause an outflow of capital as investors sell the stock; the low demand for that particular stock will be reflected in a lower price. In sum, the stock market moves up or down based on many factors, and there is no method that can accurately predict the exact movements of stock market. Ilahi, Ali, and Jamil (2015) revealed that, in stock market there are two types of investors have different sort of approaches regarding fluctuation of stock prices. One approach tells that stock market is insufficient markets in which investors use their own techniques to hit stock market prices. The second approach says that stock market is efficient market and provides same information to all investors. In this approach investors cannot beat stock market prices but all investor have same and equal information. Efficient market is considered to be the one in which all information is fully disclosed for every investor regarding security prices. The availability of information is vital to stock a price which decreases the investor's level of risk. Stock prices and hence market index are considered to be one of the best indicators of changes in economic activities by empirical studies and economic theories. If an investor wants more return on investments, they must focus mainly on the macroeconomic variables that affect the stock prices (Musílek, 1997).

On the relationships between macroeconomic variables and stock market, Ross (1976) introduced the Arbitrage Pricing Theory (APT), which he asserted that multiple risk factors can be used to explain the returns on a financial asset. This is contrary to the Capital Asset Pricing Model (CAPM) that is single factoral. Abnition, APT was accepted, it was criticized for failing to specify the exact factors that should be used to explain financial returns. Later, Chen, Roll and Ross (1986) further analyzed the APT and linked a linear function of various macroeconomic factors to the returns on financial assets (Chen, Roll and Ross (1986).

The applauded work of Chen et al., (1986) triggered framework for further analysis of the relationship between stock market movements and macroeconomic variables. No wonder plethora of empirical studies on the relationship between stock market movements and macroeconomic variables. For instance, Ahmed, (2008) found that changes in fundamentals of the economy greatly affect stock market indices. Chen et al. (1986) stated and empirically presented how movement in macroeconomic variables affects future dividends and discount rate and therefore stock prices. When Smith (1990) studied the stock market behavior in the United States, Smith (1990) detected that it changes through the different phases of the economic cycle as it declines shortly before a recession begins and rises shortly before a recession ends. Atje and Jonanovic (1993) argued that stock market development, specifically trading volume, has a relationship with economic growth. Levine and Zervos (1998) and Singh (1997) showed evidence that there is a positive relationship between stock market development and long run economic growth. Fama (1981) and Chen et al. (1986) tested the long term relationships between the changes in stock prices and macroeconomic variables in the United States. They argued that there is a long term relationship between macroeconomic variables and stock market. Fama (1981) stated that there is a strong positive correlation between common stock returns and real economic variables like capital expenditures, industrial production, real GNP, money supply, lagged inflation and interest rates. Chen et al. (1986) argued that the relevant economic variables that affect stock market are aggregate production, inflation, short-term interest rates, the maturity risk premium and default risk premium. Mukherjee and Naka (1995) found a significant relation between exchange rate, money supply, inflation and industrial production and stock prices. Other researchers Ibrahim (2003), Chaudhuri and Smiles (2004), and Buyuksalvarci (2010) found a significant relation between stock market and real output, aggregate price level, money supply, exchange rate, real GDP, real private consumption, real money, real oil price, interest rate, production index, oil price and exchange rate. All these analysis reveals that changes in money supply, interest rates, inflation and other macroeconomic variables have a relationship with stock markets (Smith, 1990; Amadi and Odubo, 2002).

2.1. Theoretical Review

The relationship between macroeconomic variables and stock market indexes has resulted to postulation of several theories as read in many finance books and empirical researches. Sharpe (1964), Lintner (1965), Ross (1976), had done applauded theoretical basis by which stocks may be valued. Therein emanates The Capital Asset Pricing Model (CAPM) and Asset Pricing Theory (APT) as basis for pricing financial assets.

2.1.1. Capital Asset Pricing Model/Security Market Line (CAPM/SML)

For the purpose of pricing or determining the prices of individual securities in the capital market, the SML was introduced. This model (CAPM) was developed by William F Sharpe and John Linter in 1963 and 1964 as testable model for determining the value of individual securities or portfolio. This model is a significant departure from the efficient market model, which focused attention on the risk – return features of portfolio (Sharpe, 1964; Lintner, 1965, 1969; Fama & French, 2004). The CAPM contends that the expected return on any asset is a linear function of its systematical risk. According to Cuthbertson and Nitzsche (2005) it predicts that only the covariance of returns between asset-*i* and the market portfolio influences the excess return on asset-*i*. In sum CAPM is a testable model for determining the prices of financial asset with a single factor. Though with inherent limitation of CAPM are; it is based on unrealistic assumptions, it is difficult to test the validity of CAPM, betas do not remain stable over time and CAPM is single factoral (has only one factor) (Ibenta 2005; Bhalla, 2011; Bodie, Kane, Marcus and Mohanty, 2013).

The CAPM model is stated as;

$Es = R_{f+} \beta_s(Rm- R_f)$

Where Es = Expected return of stock

R_f = The expected risk – free return in the market (government bond yield)

β_s = the sensitivity to market risk for the share (The systematic risk of the asset relative for the average)

Rm = the historical return of the share / market / equity market) (Market return or the return on the market portfolio of assets).

($Rm - R_f$) = the risk premium of market assets over risk free assets (The difference between the expected return on the market portfolio and the risk-free rate. It is called the expected market premium or market premium).

2.1.2. The Arbitrage Pricing Theory (APT)

Due to the sighted limitations of the CAPM, the theory of Arbitrage Pricing was evolved by Stephen Ross in 1976. Stephen Ross argued clearly that in a situation where different portfolios with multiple factors (betas) exist, CAPM with one-factor model (one beta) may not be able to produce the desired results (actual returns) for efficient portfolio. APT allows the actual return to be influenced by a numbers of market wide variables or factors such as interest rate, the exchange rate, change in inflation, change in output etc. The sensitivity of the return on asset to each of these factors is known as the 'factor beta'. Economic variables have a systematic consequence on stock market returns because economic forces affect discount rates, the ability of the firm to generate cash and future dividend payments (Chen et'al, 1986; Jecheche, 2006; Essays, 2018). The APT is a multifactor model since unlike the CAPM allows a number of potential variables (factors) to influence the expected on asset-*i*(Cuthbertson and Nitzsche 2005; Ibenta 2005; Bhalla, 2011).

The APT model is stated as;

$E(Ri) = R_f + (\beta_1 F_1 + \beta_2 F_2 + \beta_3 F_3 + \ldots + \beta_n F_n + URs)$

Where β_1= Factor betas; F = factor variable; URs = Random Error term (unanticipated part of return)

The CAPM is seen as parsimonious and commonly employed by equity analysts, but requires a precious identification of the portfolio against which the asset is compared. APT accommodates multiple sources of risk and alternative investment, the model suffers from a similar challenge of identification since many factors, and both international and domestic could influence an assets performance (Cheng 1996; Ferson and Harvey (1998); Bailey, 2005; Günsel and Çukur (2007); Mosley and Singer (2007).

Still on theoretical underpinning of the relationship between macroeconomic variables and stock market indexes, Gemmill (1996) with Keynesian view of the relationship between stock prices and interest rate, speculated that an increase in the supply of money will encourage the people to transfer the surplus money into the stock market and savings accounts, than increase in the prices of stocks effect reduce the interest rate. Thus, the relationship between the stock prices and interest rate are negatively related an increase in the stock prices decrease in the interest rate. According to lifecycle hypotheses view point regarding the relationship between interest rate and stock prices which suggest that the consumer consumption spending which the consumer spend during his lifetime not only depend on consumer disposable income but also depends on assets such as stocks. In the same vein, Sprinkle (1971) on monetarist view of relationship between stock prices and interest rate did a work on stock prices and money supply. According to Sprinkle (1971) decrease in money supply increase interest rate and increase in the supply of money falls down the interest rate in USA. Lobo (2000) studied the effect of interest rate changes on stock prices and found that stock market response quicker to the news of over pricing then news of under pricing. Lobo (2000) finally concluded that target rate announcement has significant impact on stock prices and convey new information to stock market.

2.2. Empirical Review

Although study on the relationship between stock market index and macroeconomic variables abound (Ozbay, 2009; Hunjra, Chani, Shahzad Farooq and Khan 2014; Chude, Ifurueze, and Chude, 2015), it is difficult to reach a common ground since some countries are developed, others developing and underdeveloped and different periods will also result in different outcomes (El-Nader and Alraimony, 2012; Bhunia 2012; Pramod Kumar and Puja, 2012). These studies have diverse opinions; that macroeconomic variables have either positive or negative relationship with stock market index (Fung and Lie, 1990; Smith, 1992; Soenen and Hennigar, 1998; Lobo, 2000; Maysami, Howe and Hamzah, 2004; Alam, 2007; Hoguet, 2008; Uddin and Pilinkus, 2009). However, in the past and currently, a plethora of studies have been done to unravel the relationship between macroeconomic variables and stock market indexes. In addition to previously review literature though not comprehensive but the results only; Soenen and Hanniger (1988) and Bordo, Dueker and Wheelock, 2008, found strong negative relationship between stock prices and exchange rate. Many researchers found mixed results that some variables are significant and some are not significant (Bhattacharya et al., 2001; Kurihara, 2006; Mohammad, Hussain, Jalil and Ali, 2009; Ali, 2011; Pal & Mittal, 2011; Singh, Mehta and Varsha, 2011; Ullah, Hussain and Rauf, 2014. Other researchers found significant relationship between macroeconomic variables and stock market (Bilson, Brailsford and Hooper, 2001; Hondroyiannis & Papapetrou, 2001; Ibrahim & Aziz, 2003; Tsoukalas, 2003; Maysami et al., 2004; Coleman & Tettey, 2008; Horobet & Dumitr, 2009; Buyuksalvarci, 2010; Kumar ,2010;; Ali, 2011; Wongbangpo & Sharma, 2002; Masuduzzaman, 2012; & Ray, 2012). To support the above position, Tangjitprom (2012) added that although the studies examining the causal relation between stock market and macroeconomic variables conclude different results, most of these studies agreed that there are significant relationships between macroeconomic variables and stock markets. These different results are due to different market regulations, investors, country location and other factors (Abu-Libdeh & Harasheh, 2011; Ali, 2011; Reddy, 2012).

Meanwhile, in a comprehensive review; Aggarwal (1981) in USA, a developed country, used one macroeconomic variable (dollar exchange rate) to know it variations with stock prices with monthly data of U.S stock prices and exchange rate ranges from period 1974-1978, and analyzed it with simple regression technique, Aggarwal (1981) found a positive outcome between stock prices and exchange rates. The relationship was more robust in short than in long run.

In Japan, Mukherjee and Naka (1995) used VECM to evaluate the relationship between Stock Market and macroeconomic variables (exchange rate, inflation, money supply, real economic activity, long-term government bond rate, and call money rate). A co-integrating relationship was found to exist between macroeconomic variables and stock prices. In emerging market, Gay (2016) studied effect of macroeconomic variables on the stock market returns in Brazil, Russia, India and China (BRIC). The study empirically examined the time series relationship between stock market prices and macroeconomic variables (exchange rate and oil price) using Box-Jenkins ARIMA models. The revealed no relationship between exchange rate and oil price on the BRIC countries. No significant relationship was found between present and past stock market returns, suggesting the market of BRIC exhibit the weak form of market efficiency. Also, Hsing (2011) examined the whole BRIC (Brazil, Russia, India, China and South Africa) to know the impact of Macroeconomic variables on stock market index. Hsing (2011) employed the Exponential GARCH model to examine the impact of various economic variables that cause fluctuation in South Africa's stock market index. It was revealed that that index of South Africa stock market has positive relation with growth in real GDP.

In South Asian countries, Aurangzeb (2012) found that Exchange rates have significant positive impact on the performance of stock markets of the three markets of South Asia (Pakistan, India and Sri Lanka). The result was got from descriptive statistic method with monthly data for the period of 1997 to 2010 of the three South Asian countries in a study; examination of the factors affecting the performance of stock markets of South Asian countries.

In Pakistan, Nishat and Mustafa (2007) looked at the stock market and real economy (GDP). The variable were further decomposed into GDP, production growth to represents the liquidity of stock market, real economy, and the size of the stock market represent the stock prices. Nishat and Mustafa (2007) employed error correction model and co-integration to statistically examine the relationship between the stock prices and GDP on annual data (1980-2004). It was found that, in the short run, the stock market movement explains the GDP and output growth, while both short run and long run explained that the growth of stock market variables depends on the overall growth of the economy. Jamil and Ullah (2013) investigated the impact of foreign exchange rates on stock prices using Co-integration Technique and Vector Error Correction Mechanism (VECM) with monthly data from 1998 to 2009. Jamil and Ullah (2013) revealed that relationship exists between exchange rates and stock market returns, both in the short run and long run. The short run period was found to have a positive but significant relationship, while the long run relationship is not significant. The short run sensitivity of stock market returns to exchange rates indicates that the investments in the stock market are short term and most investors liquidate their stock within one year, Jamil and Ullah (2013) added. Later, Hunjra, Chani, Shahzad, Farooq and Khan (2014) included more variables of macroeconomic variables (interest rate, exchange rate, inflation rate and the GDP) to

know their impact on stock prices with monthly data spanning from January 01, 2001 to December 31, 2011. After the empirical investigation with Granger Causality and Cointegration tests, it was observed that no relationship exist between interest rate, exchange rate, GDP and inflation rate with stock prices in the short run, but showed a relationship in the long run. This shows that macroeconomic variables are not actually felt in the short, rather in the long run, as affirmed by this study. Also, Ilahi, Ali and Jamil (2015) examined the impact of macroeconomic variables on stock market returns with multiple regression and came out the result that a weak association existed between macroeconomic variables (interest rate, inflation rate and exchange rate) and stock market returns,

In Iran, Mehran, Faraheni and Faninam (2016) used VAR to examine the effect of macroeconomic variables on the stock market index of the Tehran stock exchange. After the empirical investigation, it was observed that a positive money stock can increase stock returns. It was observed that macroeconomic variables (inflation rate, exchange rate and GDP) have significant impact on Tehran stock exchange stock index.

In India, Naik (2013) did a work on the relationships between stock market index (BSE Sensex) and five macroeconomic variables(industrial production index, wholesale price index, money supply, treasury bills rates and exchange rates) with monthly data for the period ;1994:04–2011:06. Naik (2013) engaged Johansen's Co-integration and Vector Error Correction Model (VECM) and found that in the long-run, the stock prices are positively related to money supply (M3). It was also established that money supply causes stock prices only in the long-run but no causality from stock price to money supply as found either in the long run or in the short run. Naik (2013) suggested that money supply changes have an indirect effect through their effect on real output which in turn impact the stock prices.

Employing OLS multiple regression, Ullah, Islam, Alam, Khan (2017) examined the significance of macroeconomic variables in effecting stock market performance of SAARC countries using annual data for the period 2005-2015. The result indicated that macroeconomic variables (exchange rate, foreign currency reserve and interest) significantly affect stock market performance of SAARC countries, whereas inflation and money do not have a significant relationship on stock market performance.

In New Zealand, using co-integration and Granger causality test, Gan, Lee, Young and Zhang. (2006) investigated the relationships between stock market index and macroeconomic variables from January 1990 to January 2003. Long run relationship between stock market index and the macroeconomic variables was found. The Granger causality test revealed that stock market index was not a leading indicator for changes in macroeconomic variables. Rather, results suggested that stock market was persistently determined by the interest rate, money supply and real GDP.

In Africa, Ake and Ognaligui (2010) employed Granger's causality test and variance decomposition by Cholesky to investigate the relationship between Doula Stock exchange's Market Capitalization as stock market index and Cameroonian economic growth (GDP) with quarterly time series data from 2006 to 2010. The study showed that market capitalization has positive impact on the GDP. The study also employed mathematical growth function; Gompertz model to estimate the financial variables and found link between these variables. Pearson correlation method also confirmed that financial variables were inter-related. The results revealed a positive growth of market capitalization for another five year period and positive association between macro indicators. In Ghana, Owusu-Nantwi and Kuwornu (2011) applied Ordinary Linear Squares method to study the impact of interest rates on stock market returns. The results showed that Interest rate as captured by 91-Treasury bill rate exhibited a negative relationship with the stock market return. In Kenya, Ouma and Muriu (2014) studied the impact of macroeconomic variables on the stock market returns using Arbitrage Pricing Theory (APT) and Capital Asset Pricing Model (CAPM) framework for monthly data (2003-2013). The study used Ordinary Least Square (OLS) and found money supply, inflation rate are significant determinants of the return at NSE, while exchange rates have a negative impact on stock returns. Interest rate on the other hand is not important in determining long run returns in the NSE.

Down to Nigeria, Emmanuel and Samuel (2009) investigated the impact of real GDP, inflation rate and interest rates (macroeconomic variables) on stock market returns (stock market index). With multiple regression analysis technique, study suggested that there is significant relationship among these variables. Increase in inflation and interest rates adversely affect the stock market returns while there is positive relation between real GDP and stock market returns. Employing Various econometric analyses; Augumented Dickey Fuller (ADF) test, Granger causality test, Johansen Co-integration test and Error Correction method (ECM) were Asaolu and Ogunmuyiwa (2010) to examine the impact of macroeconomic variables on Average share price (ASP) with time series data from 1986 to 2007. The results revealed that a weak relationship exists between ASP and macroeconomic variables. Osamuonyi and Evbayiro-Osagie (2012) employed VECM to unravel the relationship between macroeconomic variables and capital market index with annual data comprised of interest rates, inflation rates, exchange rates, fiscal deficit, GDP and money supply from 1975 to 2005 inclusive. It was observed that short run and long run relationship existed between stock market index and the macroeconomic variables adopted. It was also found that the macroeconomic variables selected in this study significantly influence the capital market index. Ogbulu(2010) employed ECM, cointegration and granger causality to examine the

relationship between inflation, interest rates and stock return. The study found that there is a positive and significant long run relationship between inflation and stock returns and negative a negative long run relationship between interest rates and stock returns. The granger causality test results suggested unidirectional causality running from inflation and interest rates respectively to the stock returns. Abu-Libdeh and Harasheh (2011) (2011) investigated the performance stock exchange on macroeconomic variables (inflation, exchange rate and market capitalization) relying on arbitrage pricing theory (APT) with monthly data from 2000 to 2004 using the ordinary least square (OLS) method. It was found that there is no significant effect of these macroeconomic variables on stock returns. Abraham (2011) investigated the relationship between the stock market (all share index) and selected macroeconomic variables (inflation, interest and exchange rates). Using Error Correction Model, it revealed that a significant negative relationship exist between the stock market and the MRR in the short run. That means a decrease in MRR, will lead to increase in the performance of the stock market index, whereas Treasury bill and inflation rate were seen to be insignificant. An indication that they were negatively related to the stock market in the short run, hence achieving low inflation rate and keeping the Treasury bill rate low could improve the performance of the stock market. Applying adopted Error correction modeling techniques Adeleke and Gbadebo (2012) also looked at the connection of macroeconomic policy and stock returns. The study revealed that macroeconomic policy associated with aggregate economic activity (measured by GDP), broad money supply (M2), interest rate (INT) and consumer price index (CPI) are the most important macroeconomic factors explaining stock market returns. Arodoye (2012) made an investigation into the impact of macroeconomic variables on stock prices with VAR model and found that there is long run relationship between stock prices and inflation rate and real gross domestic product for the period of 25 years. It was also revealed that variations in stock market prices are majorly caused by inflation rate, growth of domestic product, interest rate and own shocks. Adarmola(2012) employed Johansen‟s Cointegration Technique and Error correction mechanism to investigate the impact of macroeconomic variables on stock prices using quarterly data for the period of 1985 to 2009 and found that exchange rate exerts significant impact on stock market both in the short and in the long run. The study also revealed that in the short run, exchange rate had a positive significant impact on stock market performance; while in the long run, the relationship is significantly negative. Onasanya and Ayoola (2012) used VECM model with annual time series data for the period 1985- 2008 to unravel that the stock macroeconomic variables do not significantly influence the return at the stock market. Izedonmi and Mgbame and Chijoke-Mgbame (2013) employed Engle and granger two stage error correction methodology to investigate the relationship between macroeconomic factors(money supply, inflation and exchange rate) on stock returns with emphasis on arbitrage pricing theory framework with data 2000:Q1 to 2010:Q4. The results indicated that all the macroeconomic variables selected insignificantly affect stock market both in the long run and the short run. Aigbovo and Izekor (2015) employed six macroeconomic variables (exchange rates, inflation rates, interest rates, money supply, industrial production index and international oil price) on stock market Index with monthly data from January 2000 to December 2010. The study applied multivariate Ordinary Least Square (OLS) and the Error Correction Model (ECM). Prior to that Johansen cointegration test indicate that macroeconomic variables and stock market index are co-integrated. This implies that a long run relationship exists between the specified macroeconomic variables and stock market index in Nigeria. The multivariate Ordinary Least Square (OLS) and the Error Correction Model (ECM) also revealed that inflation rate, interest rate, money supply, industrial production index and oil price do influence stock market index either in the short-run or the long-run. Chude, Ifurueze and Chude (2015) employed ECM and other econometric tools to investigate the impact of some macroeconomic variables on stock market returns. The macroeconomic variables were proxied by GDP, inflation rate, and monetary policy rate. The result revealed that economic growth proxied by GDP exert a positive and significant impact on stock market returns over the years, whereas inflation rate and monetary policy rate exhibited negative and significant influence on stock market returns. It implies that a decrease in inflation and monetary policy will enhance the performance of NSE both in the short run and long run. Udi and Ohwofasa (2018) examined the macroeconomic determinants of stock performance from 1986 to 2016. The study employed ECM and found that interest rate, inflation rate and previous level of market capitalization were the major determining factors for trading activities at the NSE. It was also discovered that a negative relationship exist between stock market performance and inflation rate, interest rate and per capita income.

3. Methodology

3. Method of Study

3.1. Sample Data Collection

Hunjra, Chani, Shahzad Farooq and Khan (2014) in a study; macroeconomic variables affect the performance of the stock market consider interest rate, exchange rate, inflation rate and GDP as important among macroeconomic variables which affect the performance of the stock market. Therefore study agreed with Hunjra et al (2014) to use the following; Stock return as performance index proxied by All Share Index (ASI) as dependent variables, while the independent variable (macroeconomic variables) are represented Economic Growth (GDP), Exchange Rate

(EXCR), Inflation Rate (INFLR) and Interest Rate (INTR). These variables are annual data collected from the Central Bank of Nigeria (CBN), Nigerian Stock Exchange (NSE) Fact Books and National Bureau of Statistics (NBS) from 1985 to 2018.

3.2 Techniques

To evaluate the stationarity of the variables employed, the Augmented Dickey Fuller (ADF) unit root test is used. To determine presence of multicollinearity, the correlation matrix is used in this study and other relevant technique to examine and determine the global utility of the specified model. Because of the dynamic nature of the variables under study, Autoregressive Distributive Lags (ARDL) is engaged estimating the models.

3.3. Model Specification

The model is functionally specified as;

Stock Market Performance = f (Macroeconomic Variables) (1)

All Share Index= f (Economic Growth, Exchange Rate, Inflation Rate and Interest Rate) (2)

ASI = f (GDP, EXCR, INFLR, INTR) (3)

Explicitly;

$$ASI = \alpha_0 + \alpha_1 ASI_{t-1} + \alpha_2 GDP + \alpha_3 GDP_{t-1} + \alpha_4 EXCR + \alpha_5 EXCR_{t-1} + \alpha_6 INFLR + \alpha_7 INFLR_{t-1} + \alpha_8 INTR + \alpha_9 INTR_{t-1} + e_{t-1} \quad (4)$$

$$ASI = \alpha_0 + \alpha_1 \log ASI_{t-1} + \alpha_2 \log GDP + \alpha_3 \log GDP_{t-1} + \alpha_4 \log EXCR + \alpha_5 \log EXCR_{t-1} + \alpha_6 \log INFLR + \alpha_7 \log INFLR_{t-1} + \alpha_8 \log INTR + \alpha_9 \log INTR_{t-1} + e_{t-1} \quad (5)$$

Where et_{-1} are stochastic elements

Operational form (Apriori Expectation)

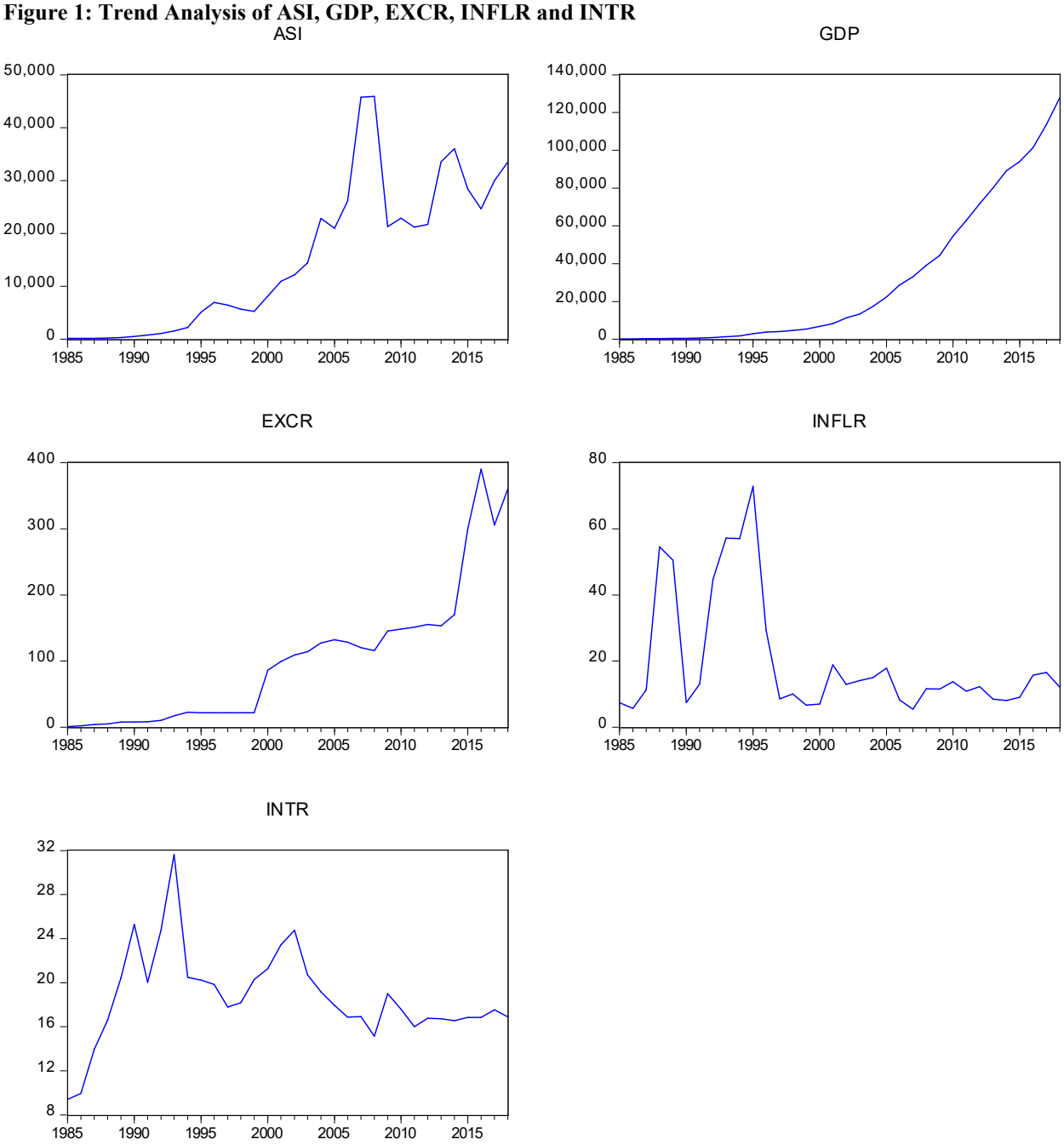
α_1, α_2, α_3, and α_4 are coefficient of GDP, EXCR, INFLR and INTR respectively. It is expected that macroeconomic variables will either positively or negatively influence stock market performance.

4. Results and Analysis

4.1: Trend Analysis of Data

This estimation of the model specified in this study will commence with trend analysis of data. The time series plot of the data is shown in figure I below. The figures below revealed that all the variables recorded period of peaks and trough as well exhibited undulating movement except GDP that trended smoothly upwards and EXCR that also recorded upward movement, though not smooth, suggesting non-stationarity of the variables as expected.

Figure 1: Trend Analysis of ASI, GDP, EXCR, INFLR and INTR



Authors' computation output using E-view 10.

Next is descriptive statistical analysis;

4.2: Description of Variables

Table 1 below depicts summary of statistics that describe the distributional features of all the data. The variables recorded standard deviation of the following; 13992.35, 38661.73, 105.8734, 18.14077and 4.171185 for ASI, GDP, EXCR, INFLR and INTR respectively. ASI and GDP showed Kurtosis lower than 3 indicating platykurtic distributions whereas EXCR, INFLR and INTR greater than 3, suggesting a leptokurtic distribution. The skewness coefficients of 0.594573, 1.125664, 1.197737, 1.653292 and 0.568673 for ASI, GDP, EXCR, INFLR and INTR respectively indicate a positive stewed distribution. GDP, EXCR, INFLR and INTR record p-values of JarqueBera as follows; 0.027514, 0.010513, 0.000116 and 0.032464 respectively, which is significant at 5% suggesting abnormality distribution. While, ASI records 0.247710 p-value of JarqueBera; insignificant at 5%, a good evidence of normal distribution.

Table 1: Descriptive Statistics for ASI, GDP, EXCR, INFLR and INTR

INDEXES	ASI	GDP	EXCR	INFLR	INTR
Mean	15205.32	30794.20	103.0116	19.55176	18.70882
Median	11550.40	9733.197	104.0000	12.15625	17.87500
Maximum	45908.88	127762.5	390.0000	72.83550	31.65000
Minimum	127.3000	192.2733	0.894000	5.382200	9.430000
Std. Dev.	13992.35	38661.73	105.8734	18.14077	4.171185
Skewness	0.594573	1.125664	1.197737	1.653292	0.568673
Kurtosis	2.254315	2.936082	3.832159	4.362998	4.882937
Jarque-Bera	2.790994	7.186136	9.110273	18.12095	6.855258
Probability	0.247710	0.027514	0.010513	0.000116	0.032464
Sum	516980.8	1047003.	3502.394	664.7598	636.1000
Sum Sq. Dev.	6.46E+09	4.93E+10	369902.9	10859.89	574.1598
Observations	34	34	34	34	34

Authors' computation output using E-view 10.

4.3: Global Utility Examination and Determination

In the macroeconomic analysis, determination of global utility or usefulness of the specified models gives a research confidence to making inference that can be referred for policy making. To achieve this, the researchers employed correlation matrix and Ordinary Least Square (OLS) as shown below;

4.3.1: Multicolinearity Test

Table 2 below shows the correlation matrix of the variables. The correlations between ASI, GDP, EXCR, INFLR and INTR range from -0.426419 to 0.927348, indicated that the variables are not linearly correlated. Therefore, the researchers have sufficient evidence to declare no presence of multicollinearity in the model.

Table2: Correlation Matrix

Variables	ASI	GDP	EXCR	INFLR	INTR
ASI	1.00000	0.752892	0.730439	-0.426419	-0.276004
GDP	0.752892	1.000000	0.927348	-0.329531	-0.282595
EXCR	0.730439	0.927348	1.000000	-0.335204	-0.185228
INFLR	-0.426419	-0.329531	-0.335204	1.000000	0.430099
INTR	-0.276004	-0.282595	-0.185228	0.430099	1.000000

Authors' computation output using E-view 10.

4.3.1: Ordinary Least Square (OLS) Method

Table 3 shows the Ordinary Least Square (OLS) estimated model for the relationship between macroeconomic variables and stock market. From the table Durbin-Watson statistics is 0.636529, showing presence of autocorrelation. This is unreliable and cannot be used for further analysis and policy formulation.

Table 3: Ordinary Least Square (OLS) method

Dependent Variable: ASI				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
GDP	0.181312	0.118320	1.532387	0.1363
EXCR	26.43760	42.75298	0.618380	0.5412
INFLR	-144.2254	104.0717	-1.385827	0.1764
INTR	-56.87713	454.4591	-0.125153	0.9013
C	10782.55	8327.444	1.294821	0.2056
R-squared	0.607713	Mean dependent var		15205.32
Adjusted R-squared	0.553604	S.D. dependent var		13992.35
S.E. of regression	9348.684	Akaike info criterion		21.25891
Sum squared resid	2.53E+09	Schwarz criterion		21.48338
Log likelihood	-356.4015	Hannan-Quinn criter.		21.33546
F-statistic	11.23137	**Durbin-Watson stat**		0.636529
Prob(F-statistic)	0.000013			

Authors' computation output using E-view 10.

The researchers proceeded to testing the stationarity of the variables. This procedure is normal in macroeconomic time series analysis to know the most suitable technique for estimating the model. Here, the researchers employed Augumented Dickey Fuller (ADF) unit root test as depicted below;

4.4: Stationarity/Unit Root Test

Stationarity is statistical proven procedure in macroeconomic time series to ascertain a suitable method for data analysis. Table 4 below depicts the stationary test for both level and first difference data. The results show ASI, GDP, EXCR and INFLR are difference once to be stationary or integrated at order one, while INTR is stationary at level. The variables have different orders of integration, justifying the earlier adopted ARDL model.

Table 4: ADF UNIT TEST

Variables	Lag SCI	Level	1st Difference	Critical Value		Remarks
		ADF Statistics	ADF Statistics	5%	10%	
LnASI	8	-	-4.053589(0.0037)	-2.957110	-2.617434	@1(1)
LnGDP	8	-	-3.347202 (0.0209)	-2.957110	-2.617434	@1(1)
LnEXCR	8	-	-5.258081 (0.0001)	-2.957110	-2.617434	@1(1)
LnINFLR	8	-	-5.130716(0.0002)	-2.957110	-2.617434	@1(1)
LnINTR	8	-3.386935 (0.0188)	-	-2.954021	-2.615817	@1(0)

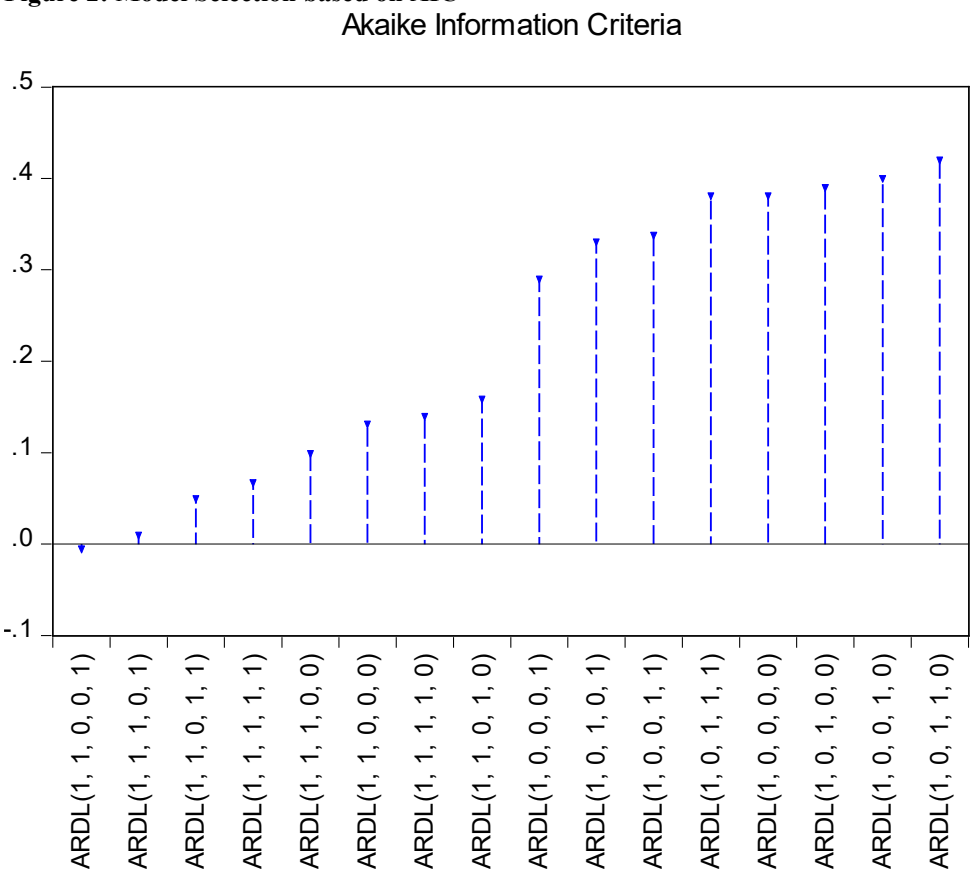
Authors' computation output using E-view 10.

The researchers confirmed and validated the adoption Autoregressive Distributive Lag (ARDL) to estimating the model, then proceed to model selection using Akaike Information Criterion (AIC) as shown below in Figure 2 below.

4.5: Model Selection

Figure 2 below depicts ARDL model selection based on Akaike Information Criterion (AIC). Information criteria select models that minimize their values. From figure 1 below, the best model, according to AIC, is an ARDL (1, 1, 0, 0, 1). This implies that a model that includes lagged value of the dependent variables as an additional regressor is the best description of researchers' data.

Figure 2: Model Selection based on AIC



Authors' computation output using E-view 10.

The researchers therefore proceed to estimating the models with ARDL, aimed at proffering dynamic solution to the static problem of time series. This is shown in table 5 below.

4.6: Model Estimation and Results

Having satisfied with all previous tests, the researchers confidently proceeded to estimating the relationship between stock market performance (ASI) and macroeconomic variables (GDP, EXCR, INFLR and INTR) in Nigeria with ARDL framework.

Table 5 below reveals that ASI has p-value of 0.0000 suggesting that ASI is autoregressive. It is statistically confirmed evidence suggesting that ASI in the past can predict future events in the stock market in Nigeria. It conspicuously revealed that GDP has coefficient of 2.186996 with p-value of 0.0026 and INTR at lag 1 has coefficient of 0.670474 with p-value of 0.0279, suggesting GDP and INTR have positive and significant relationship with ASI at 5% significant level, but GDP at lag 1 has coefficient of -1.993335 and p-value of 0.0031 indicating GDP negatively and significantly impacted ASI afterwards. INFLR has coefficient of -0.173645 with p-value of 0.0462 suggesting that IINFLR has negative and significant impacted on ASI. Whereas EXCR has coefficient of 0.009608 and p-value of 0.9441, showing INFLR insignificantly impact ASI. The adjusted R-square is 0.984499 suggesting that the estimated ARDL (1, 1, 0, 0, 1) model is moderately fitted, with the explanatory variable jointly accounting for 98.4% of total variation of ASI. The probability of F-Statistic is 0.000000, an indication that the estimated model is highly significant. Durbin-Watson Statistics (Dw) is 2.093378 telling the researchers not to border about autocorrelation. The researchers can boldly say that the model did a good job to describe the relationship between macroeconomic variables and stock market in Nigeria. The autonomous component or constant (C) has coefficient of 0.266447 with p-value of 0.7848, which is insignificant. This shows that interest rate, exchange rate, inflation rate and GDP are the most important among macroeconomic variables which affect the performance of the stock market.

Table 5: ARDL Estimation Results

Selected Model: ARDL(1, 1, 0, 0, 1) **Dependent Variable: ASI**				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.***
LNASI(-1)	0.714293	0.091894	7.773034	0.0000
LNGDP	2.186996	0.654387	3.342051	0.0026
LNGDP(-1)	-1.993335	0.609934	-3.268116	0.0031
LNEXCR	0.009608	0.135564	0.070873	0.9441
LNINFLR	-0.173645	0.082766	-2.098016	0.0462
LNINTR	-0.442267	0.332805	-1.328909	0.1959
LNINTR(-1)	0.670474	0.287294	2.333754	0.0279
C	0.266447	0.965131	0.276073	0.7848
R-squared	0.987890	Mean dependent var		8.811319
Adjusted R-squared	0.984499	S.D. dependent var		1.747643
S.E. of regression	0.217587	Akaike info criterion		-0.005223
Sum squared resid	1.183598	Schwarz criterion		0.357567
Log likelihood	8.086180	Hannan-Quinn criter.		0.116845
F-statistic	291.3410	**Durbin-Watson stat**		2.093378
Prob(F-statistic)	0.000000			

Authors' computation output using E-view 10.

4.6.1: Test of long run Relationships between Macroeconomic Variables and Stock Market

Table 6 below depicts ARDL Bound cointegration Test examining if there is long run relationship in the model. From the bound test, it can be seen that the F-Statistics is 4.731908 which is greater than all the critical values at 1(0) and 1(1) bounds at1% to 10%. These reject the null hypothesis of no levels of relationship. With this result the researchers have enough evidence to pronounce a long run relationship between Stock market performance proxied by All Share Index (ASI) and macroeconomic variables (Economic Growth (GDP), Exchange Rate (EXCR), Inflation Rate (INFLR) and Interest Rate (INTR)) in Nigeria.

Table 6: ARDL Bound Cointegration Test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.731908	10%	1.9	3.01
K	4	5%	2.26	3.48
		2.5%	2.62	3.9
		1%	3.07	4.44

Authors' computation output using E-view 10.

4.6.2: Short run and Long run impact of Fiscal Policy Variables on Bank Performance

Table 7 below reveals that GDP and INFLR as macroeconomic variables affect Stock market performance both in short and long run.

Table 7: Cointegrating and Long run Form

Dependent Variable: D(LNASI) **Selected Model: ARDL(1, 1, 0, 0, 1)**				
Cointegrating Form				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.266447	0.965131	0.276073	0.7848
LNASI(-1)*	-0.285707	0.091894	-3.109106	0.0046
LNGDP(-1)	0.193661	0.130541	1.483522	0.1504
LNEXCR**	0.009608	0.135564	0.070873	0.9441
LNINFLR**	-0.173645	0.082766	-2.098016	0.0462
LNINTR(-1)	0.228207	0.275450	0.828485	0.4152
D(LNGDP)	2.186996	0.654387	3.342051	0.0026
D(LNINTR)	-0.442267	0.332805	-1.328909	0.1959
Long run Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDP	0.677831	0.355333	1.907592	0.0680
LNEXCR	0.033628	0.475376	0.070740	0.9442
LNINFLR	-0.607772	0.289093	-2.102344	0.0458
LNINTR	0.798743	0.916308	0.871697	0.3917
C	0.932586	3.434309	0.271550	0.7882
EC = LNASI - (0.6778*LNGDP + 0.0336*LNEXCR -0.6078*LNINFR + 0.7987 *LNINTR + 0.9326)				

Authors' computation output using E-view 10.

4.6.3: Correction Short Run Error Test

As shown in the output in Table 8 below, error correction equation, CointEq(-1) has expected negative sign of -0.285707 and p-value of 0.0001 indicating the model is statistically significant. It can also be seen that 28.5% of errors from the equilibrium can be corrected in the next period, and speed of adjustment is 28.5%.

Table 8: ARDL Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDP)	2.186996	0.304439	7.183687	0.0000
D(LNINTR)	-0.442267	0.234648	-1.884814	0.0711
CointEq(-1)*	-0.285707	0.063625	-4.490510	0.0001

Authors' computation output using E-view 10.

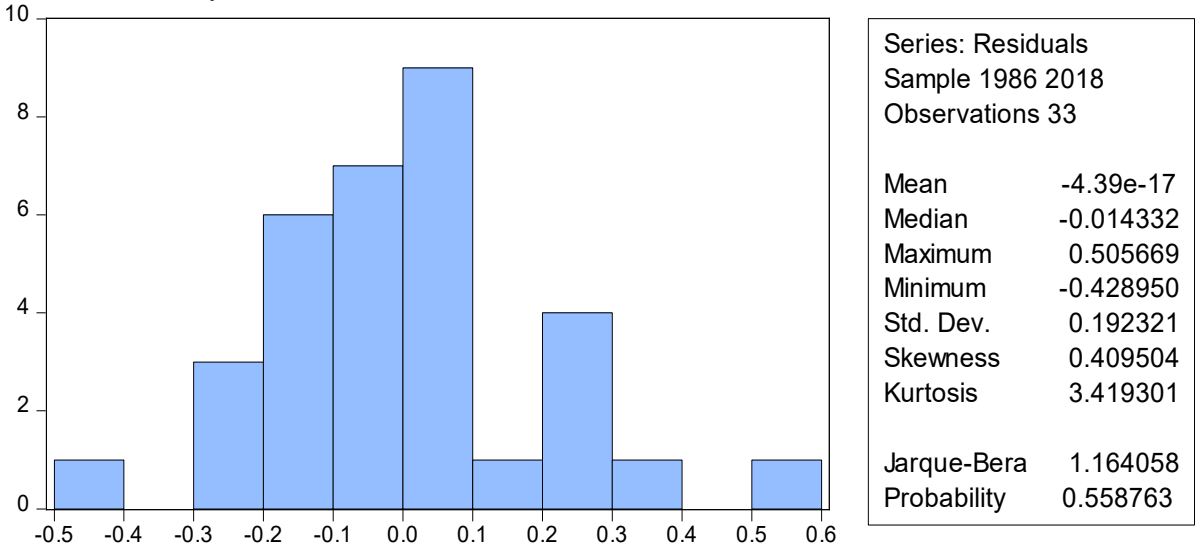
Having concluded and satisfied with estimation of the model, the researchers resorted to run some residual diagnostic test; Normality Test, Serial Correlation Test and Heteroscedasticity Test as seen table 9 and 10 below;

4.7: Residual Diagnostic Test

4.7.1: Normality Test

From Table 9 below, it is seen that Jarque-Bera Statistic is 1.64058 with P- value of 0.5588763 which not significant at both 5% and 10% and Kurtosis of 3 approximately, clear evidence of normal distribution.

Table 9: Normality Distribution



Authors' computation output using E-view 10.

4.7.2: Serial Correlation Test and Heteroscedasticity Test

The table 10 below reveals that Heteroscedasticity Test: ARCH F-Statistic has P-value of 0.5141, suggesting homoscedasticity of the model. Also, Breusch-Godfrey Serial Correlation LM Tests F-Statistic has P-value of 0.7930, which shows of non rejection of the null hypothesis, confirming no serial correlation.

Table 10: Heteroscedasticity and Serial Correlation Tests

Heteroskedasticity Test: ARCH			Prob.
F-statistic	0.435928	Prob. F(1,30)	0.5141
Obs*R-squared	0.458330	Prob. Chi-Square(1)	0.4984

Breusch-Godfrey Serial Correlation LM Test:			Prob.
F-statistic	0.070386	Prob. F(1,24)	0.7930
Obs*R-squared	0.096498	Prob. Chi-Square(1)	0.7561

Authors' computation output using E-view 10.

4.8: Causality Relationship

From the table 11 below, GDP granger cause ASI ($F\text{-}stat_{GDP}$= 2.52619; $Prob_{GDP}$= 0.0987, significant at 10%). EXCR granger cause ASI ($F\text{-}stat_{EXCR}$= 3.43758; $Prob_{EXCR}$= 0.0468, significant at 5%). That suggests a unidirectional causality between GDP, EXCR and ASI, while INFLR and INTR have no identifiable causal relationship with ASI since their p-values are greater than the significant levels of 5% and 10%.

Table 11: Pairwise Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause ASI	32	2.52619	0.0987
ASI does not Granger Cause GDP		2.17181	0.1335
EXCR does not Granger Cause ASI	32	3.43758	0.0468
ASI does not Granger Cause EXCR		1.43047	0.2568
INFLR does not Granger Cause ASI	32	0.19997	0.8200
ASI does not Granger Cause INFLR		2.43567	0.1065
INTR does not Granger Cause ASI	32	0.04082	0.9601
ASI does not Granger Cause INTR		2.31032	0.1185

Authors' computation output using E-view 10.

5: Concluding Remarks and Recommendations

The researchers in this study; Dynamic Interactions of Nigerian Stock Market and Macroeconomic Variables, one the most researched areas in Finance made the following empirical observations; that all share index is reliable in predict future activities in the stock market in Nigeria. This is in agreement with the assertions of Musílek (1997) of Stock prices are considered to be one of the best indicators of changes in economic activities by empirical studies and economic theories. If an investor wants more return on investments, they must focus mainly on the

macroeconomic variables that affect the stock prices. It was also found that economic growth proxied by Growth Domestic product and Interest rate have positive and significant relationship with all share index within the period of study, while inflation exerts negative influence on All Share Index. It was also found that exchange rate has insignificant impact on All Share Index within the scope of the study. The above findings agree with the apriori expextation of this study. It observed that the autonomous component is insignificant, validating the assertion of Hunjra et al (2014) that interest rate, exchange rate, inflation rate and GDP are the most important among macroeconomic variables which affect the performance of the stock market. The output of the analysis also revealed that long run relationship between All Share Index and macroeconomic variables (Economic Growth, Exchange Rate, Inflation Rate and Interest Rate in Nigeria. The findings in this study majorly collaborate with the Arbitrage Pricing Theory that opined that the actual return is influenced by a numbers of market wide variables or factors such as interest rate, the exchange rate, change in inflation, change in output etc. Consequently, the researchers are of the opinion that government and her regulatory bodies devise adequate measures to curtail in inflation in Nigeria. This is because the finding in this study is a plausible affirmation that inflation is an economic crippler that destroys the economic power of investors. Again, investor are encourage channel their fund to the stock market despite the volatility in exchange rate in Nigeria since exchange rate has insignificant impact on All Share Index.

6. Suggestion for Further Study and Limitation of Study

The researchers suggest further studies should have global perspective by looking at least one stock market of developed, emerging, developing and underdeveloped nations. This will help to validate possible inferences, theories and policy making. The study is limited to Nigeria Stock Market. The researchers had wished it was extended to the study to Stock Market outside Nigeria but was hindered by unavailability of data to the researchers.

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